

widespread the distribution of glycogen is, and we may safely draw the conclusion that its function is extremely important.

As before, however, we hesitate to follow Dr. Creighton in his speculations regarding the nature of these functions. For in addition to its formative and respiratory functions, the multifarious duties of lymph are now ascribed to this single and comparatively simple material. The arguments that lead to this startling conclusion are extremely curious to follow. He finds that in snails and slugs which have been specially worked at, glycogen is chiefly deposited in certain connective tissue corpuscles, which are designated plasma cells. These are principally arranged along the course of the blood-vessels, and in some instances they form a complete coating to the vessels. This is considered to indicate the existence of a primitive lymphatic system. If this is so, there should be evidence in the higher molluscs that this becomes more perfect, and the different stages in the evolution of the lymphatic vessels should be capable of demonstration. There is, however, no attempt to do this; in fact, it is admitted that in the highest molluscs, the cephalopods, which have a very perfect vascular system with arteries, veins and capillaries, this arrangement of the plasma cells does not occur, and these animals have little or no glycogen in their tissues. Moreover, if the arrangement and chemical construction of the plasma cells of the snail has the great morphological value attached to it by Dr. Creighton, it is remarkable that it is not found throughout the class of gastropod molluscs, to which the snail belongs; it is apparently limited to quite a few members of the group. So much importance is attached to this idea by the author, that he almost seems, though his words are not quite clear on this point, to assume that the snail and slug are, in the line of descent, very near ancestors of the vertebrate family. There is no attempt to show the links in the chain, nor to explain why an exceptional and almost accidental arrangement of connective tissue cells in one or two isolated molluscs should confer this honour upon such isolated specimens. We do not think that a theory of this kind will do much to shake the thoroughly well-grounded work of Haeckel and other morphologists.

To the physiologist the next conclusion drawn will be even more startling; it runs as follows: if the plasma cells represent a lymph system, the glycogen of those cells must represent lymph. It hardly seems worth while to argue against such an unwarrantable suggestion. Any other constituent of the plasma cells might equally well have been selected. Lymph is a complex fluid acting as a middle-man between blood and tissue elements; it is contained in spaces between and around the cells, not in the interior of their cell-substance. If one seeks for an analogy between the two mobile fluids of the vertebrate, in the invertebrates it will be found much more easily in many members of the worm group which have coloured blood in their vessels, and colourless fluid in certain parts of their body-cavity.

Dr. Creighton's production, therefore, though interesting as a record of observations, is most disappointing so far as conclusions are concerned. Wide, sweeping, almost revolutionary theories are advanced without a shred of

real evidence to support them. If the book serves no other purpose, it will at least act as a warning example of the danger of drawing hasty generalisations from imperfect data, data gathered from the exclusive study of one particular small point with one exclusive method.

#### OUR BOOK SHELF.

*The Elements of Alternating Currents.* By W. S. Franklin and R. B. Williamson. Pp. 212. (New York: The Macmillan Company. London: Macmillan and Co., Ltd., 1899.)

IN this book will be found a very fair *résumé* of the theory and practice of alternate current working, and of the modern developments associated with the use of polyphase currents and the induction motor.

It is interesting to compare a work such as the present, characteristic as it is of American methods, with similar works published in this country. Messrs. Franklin and Williamson's treatment of their subject is distinguished by conciseness, and by the almost total exclusion of anything of historical interest, though the authors, in the preface, acknowledge their great indebtedness to Steinmetz, "whose papers are unique in their close touch with engineering actualities." The beginner will, perhaps, find that the brevity of treatment renders the theory, and the usually excellent graphical constructions, here and there obscure. But, on the other hand, the comments upon the practical aspect of each question taken up are of great value, especially to readers in this country, where experience with polyphase currents is limited to some half dozen installations of but few months standing.

Continental engineers, accustomed to use the well-known Hartmann and Braun instruments, will be astonished to learn that "the only hot-wire instrument which is much used is the Cardew voltmeter." Under the heading "Revolving Contact Makers," the only form described is that using a jet of conducting liquid making contact with a revolving pin connected through the shaft of the alternator; while the much more convenient form with two brushes and a revolving piece of metal let into an insulating disc, which enables an electrostatic voltmeter to be momentarily connected across *any* two points in the alternator circuit, is not mentioned.

The chapters relating to the theory of the synchronous motor, the rotary converter and the induction motor contain information not easy to find elsewhere in accessible form. The short concluding chapter on the transmission of power, however, lacks a simple statement of the relative amounts of copper required by different systems of electrical transmission, and the respective merits of these systems as regards regulation.

Much information is to be found in this book in small compass, and it will prove of value to engineers engaged in alternate current practice.

D. K. M.

*Oysters and Disease: An Account of Certain Observations upon the Normal and Pathological Histology and Bacteriology of the Oyster and other Shellfish.* By Profs. W. A. Herdman, D.Sc., F.R.S., and R. Boyce, M.B. Lancashire Sea Fisheries Memoirs. No. 1. Pp. 60; 8 plates. (London: George Philip and Son, 1899.)

THE monograph before us gives the results of three years' work by the authors on oysters and disease. This thesis is, of course, by no means new to either the general scientific reader, the medical officer of health, or, indeed, the general public. Oysters have for several years been suspected, and, indeed, in some cases almost proved, to be the source of typhoid fever. A most interesting report was issued upon this subject by the Local Government Board, which, if the reviewer remembers rightly, was

fully noticed in these columns. As the readers of NATURE are probably aware, as a result of this report, an Oyster Bill has been laid before Parliament.

So far as the present memoir is concerned, it may be divided into two parts. The first part deals with the "greenness" of oysters. This appears to be due in different kinds of oysters to different causes. In certain oysters it seems undoubtedly connected with the presence of an excess of copper; and so far as the Falmouth oyster is concerned, the authors confirm the earlier work of Prof. Thorpe in this connection. From the general histological standpoint, it is interesting to note that the authors found Macallum's hæmatoxylin method to be a very delicate test for copper as well as iron. But the presence of "greenness," even when connected with copper, does not necessitate the oyster in question being unfit for food. Some "greenness" has no relation with the presence of copper, as, for instance, in the case of Marennes oysters.

With regard to the bacteriology of oysters from the standpoint of disease, the monograph does not contain any very important additions to our knowledge. So far as concerns the subject of deepest interest to the public, namely, the relation between oysters and typhoid fever, the general reader will be relieved by Conclusion 12, p. 54:—

"Although we did not find the *Bacillus typhosus* in any oyster obtained from the sea or from the markets, yet in our experimental oysters, inoculated with typhoid, we were able to recover the organism from the body of the oyster up to the tenth day. We show that the typhoid bacillus does not increase in the body or in the tissues of the oyster, and our figures indicate that the bacilli perish in the intestine."

*Scientific Papers.* By John William Strutt, Baron Rayleigh, D.Sc., F.R.S. Vol. i. 1869–1881. Pp. xvi+562. (Cambridge: At the University Press, 1899.)

THE publication of collections of scientific papers serves a three-fold purpose. It renders easy of access scattered papers for which search would otherwise have to be made through a considerable mass of proceedings, transactions and journals; it furnishes a history of the part played by the author of the papers in the onward progress of scientific knowledge, and it affords an insight into the thoughts which the author has put into writing at various stages of his lifetime. To adequately serve the last object the collection must be comprehensive, and no paper should be deemed too short or of too passing interest to be included in the series. We cannot do better than quote Lord Rayleigh's remarks on this point in the preface:—

"Some short papers of a rather slender character have been included: these may serve to mitigate the general severity. In consulting similar collections I have usually felt even more grateful for the reproduction of short and often rather inaccessible notes than for the larger and better-known memoirs."

Even the questions set by Lord Rayleigh in the Mathematical Tripos for 1876 are here reprinted, and the pages containing these will, we are certain, be well fingered in the copy which finds its way into the Cambridge University Library.

An analysis of the seventy-eight papers in the present volume, and which represent Lord Rayleigh's work in the period 1869–1881, gives the following results:—Acoustics and vibrations, 24 papers; optics, 23; hydrodynamics, 9; electricity, 6; dynamics, 5; pure mathematics, chiefly harmonic analysis, 6; various, 5.

It will be seen that the main portion of Lord Rayleigh's work in this period deals with sound and light. Many of the papers on the former subject have been included in his well-known "Theory of Sound," and are not reproduced; but readers of the latter book will learn from the references here given how much of the theory is due

to Lord Rayleigh himself. We need only refer to the theory of resonance, the general theory of vibrations and its particular case of "approximately simple systems," the pitch of organ pipes. Of optical papers, the best known are Lord Rayleigh's investigations on the scattering of light by small particles, and on the colour and polarisation of the sky. We have also in the present volume papers on the construction of diffraction gratings and their reproduction by photography, experiments on colour, and optical investigations relating to the spectro-scope. Lord Rayleigh's hydrodynamical papers on the stability and instability of jets are well known. The last paper in the volume is that on the infinitesimal bending of surfaces of revolution, which subsequently formed the subject of discussion at the hands of Prof. Love. The volume will be a welcome addition to our libraries, as will be those to follow containing Lord Rayleigh's later papers. G. H. B.

*Ueber das System der Nagethiere; eine phylogenetische Studie.* Von Tycho Tullberg. Pp. v+514; 56 plates. (Upsala: Berling, 1899.)

THIS separately published memoir, with its own pagination, is an excerpt from the *Nova Acta* of the Royal Society of Upsala. It is not too lengthy for the due treatment of the subject, and it is very copiously illustrated. Dr. Tullberg has performed a useful piece of work in bringing together the bulk of what is known about the rodents into one comprehensive monograph; his proceeding might be well imitated for other orders, in view of enormous and increasing literature. The present memoir, however, is not a compilation in any sense of that word. The first part, which is rather more than one-half, consists of a series of descriptions of a large number of species of rodents examined by the author. These descriptions are quite full, and deal with external, as well as internal, characters. In some of the facts there detailed, we observe that the author is at variance with the statements of others. For example, he does not distinguish the two genera of Lemmings, which are a little apt to be confused, by the occurrence or non-occurrence of fur upon the soles of the feet. At this moment we are unable to confirm or to dispute his correction of current statements. The list of literature is an abundant one; but the author seems to have overlooked Mr. Beddard's paper upon the rodent brain, and Mr. Parson's account of the anatomy of the little known Cape Jumping Hare, *Pedetes*. Perhaps the MS. of the work was in type before the appearance of the last of these papers. The scheme of classification adopted by the author will not commend itself to all. The Sciuro-morpha and Myomorpha of many are associated into a tribe, Sciurognathi, which is contrasted with the only other tribe of "simplicidentate" rodents, viz. Hystricognathi. The genus *Pedetes*, to which we have referred, is placed in the former, a view which we do not share. We would also follow Mr. Thomas and regard the genus *Bathyergus* as belonging to the Myomorpha, and not to the "porcupiny" rodents, where Dr. Tullberg places it. The criticisms, however, do not affect the general merits of this important contribution to our knowledge of the mammalia. F. E. B.

*A Surgical Operating Table for the Horse.* By J. A. W. Dollar, M.R.C.V.S. Pp. vi+42. (Edinburgh: David Douglas, 1900.)

VETERINARY surgeons are well aware of the difficulty of controlling horses during operations. Mr. Dollar describes the methods in general use, and various operating tables used in France, Germany, Spain and elsewhere. A table devised by him, and described in detail, is a machine by means of which a horse can be supported in any position and operated upon. Numerous illustrations show the table in different positions during the actual progress of veterinary operations.